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Technology for Development of Soft and Hard Skills Competencies in Engineering Students of Higher Education Institutions

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Abstract: *In the article, it is concluded that one of the main reasons for the delay in the implementation of hundreds of scientific developments created in the fields of electrical engineering and electronics by higher educational institutions in the field of technology or the establishment of innovative enterprises based on scientific development is the lack of specialists with the master of their profession and entrepreneurial competencies in these directions. done In order for engineering students to engage in entrepreneurial activities in their field of specialization in the future, it was shown that, in addition to hard skills, they need to develop "soft skills" as well. Also, in the article, the necessary recommendations for the development of soft and hard skills competencies in engineering students are given.*

Keywords: *engineer; entrepreneurship; soft skills; hard skills; competence; technology; startup project; laboratory, practical training; course project; business plan.*

World experience shows that competition in modern markets at a time when business activity is becoming increasingly tense, it can easily and quickly modernize production due to its mobility, low investment requirements, the ability to update the types of products produced, adapt well to the changing requirements of the market economy, and thus fill the local market with the necessary goods and services it is the most important sector that determines the structural basis of the economy, and also serves as the main factor and source in providing employment to the population and increasing its income.

Regional programs such as "Founders4School" (Great Britain), The Young Entrepreneurs Academy (Canada), Youth Entrepreneurship Program (California), and "AMIDEAST" (Egypt) aimed at attracting and supporting young people in entrepreneurship are implemented on a global scale.

Attracting entrepreneurship in Russia, innovative in them

several programs are implemented in order to form ideas, personal and management qualities ("**Ты предприниматель**", " **Бизнес для меня** ", "Youth entrepreneurship in Russia", "Start up, Don!" and others). Those between the ages of 18 and 35 can participate in these programs [1÷6].

The results of the above analysis show that the youth are considered to be a force capable of innovative and creative thinking, and the support of youth entrepreneurship by the state not only prevents unemployment, but also has an impact on economic growth.

The knowledge and entrepreneurship of young people by our state a number of contests are being held in order to further expand the scope of improving their skills, to establish a system that gives the right direction to their entrepreneurial activities, and thereby to widely involve young people who want to start entrepreneurial activities in entrepreneurial activities ("My business idea", "Young entrepreneur-helpful to the country", "Start up") [7, 8].

As a result of the wide opportunities created for entrepreneurial activity, the number of business enterprises of various forms is increasing. However, it is worth saying that there are still not enough innovative enterprises based on the latest scientific achievements in the fields of electrical engineering and electronics. However, it is possible to apply to the production of hundreds of scientific developments created by professors and teachers of higher educational institutions in the field of technology or to organize production based on scientific development [11÷15]. It is known from world experience that the establishment of production enterprises in these areas is the most profitable and has a bright future.

Unfortunately, existing business entities prefer business related to the promotion of foreign goods in the domestic market rather than establishing business-oriented production enterprises in the fields of electrical engineering, electronics, electrotechnology and nanotechnology. It can be concluded that one of the main reasons for the stagnation of production activity in these areas is the lack of specialists with the master of their profession and entrepreneurial competencies in these directions.

Shavkat Mirziyoyev, the President of the Republic of Uzbekistan, drew attention to this issue and said, "Unfortunately, the quality of education in most higher educational institutions does not meet international standards and the requirements of the real economy. Most of the graduates who started working in production have to be retrained in most cases. We are accepting many programs, but are there enough motivated and patriotic, highly qualified personnel to implement them? They pointed out the painful problem in the higher education system, saying, "Are the specialists being trained in higher education institutions capable of fulfilling the huge tasks set before us?"

The analysis of the survey questionnaires received from the students of the 4th stage of the graduate course of the "Electronics and Instrumentation" and "Electrical Engineering, Electrical Mechanics and Electrotechnologies" of the Kokan branch of the Tashkent State Technical University showed that 70-75 percent of the graduates want to engage in entrepreneurial activities in their specialty. reported. However, they indicated that they lacked the knowledge and skills to start and run a business, and generally lacked the imagination to set up their own business, as well as insufficient funds for business activities. Also, in the survey questionnaires, higher education institutions suggested adding training aimed at forming entrepreneurial knowledge and skills to their curricula and programs.

In fact, in today's complex market economy, if an engineer wants to effectively engage in business activities, he needs only technical skills, that is, knowing the construction and operation of technical equipment, being able to assemble, install, adjust and design them, that is, "hard skills" (hard skills). Competencies alone are not enough.

In the modern labor market, private employers want to hire specialists who can clearly define the goal, complete tasks on time, stress-resistant, able to work effectively in a team and have leadership skills, who can patiently listen and understand colleagues and customers, citizens and communicate with them. . Because hiring a specialist who has graduated from a higher education institution by asking questions

within the scope of the subjects he studied is not a guarantee that he will work in the organization and in the team with the proper organization of interpersonal relations.

Also, in order to achieve high success in business in one's specialty, in addition to hard skills, "soft skills" are also necessary [9, 10].

Currently, there is no single list of entrepreneurial competencies. After reviewing a number of business publications and analyzing 1,300 questionnaires, researchers identified 11 criteria for entrepreneurial leaders [10]:

1. Identify opportunities. Ability to search and find business opportunities;
2. Vision and influence. Ability to influence everyone involved in the project, involve them in the implementation of the concept and business strategy;
3. Work in conditions of uncertainty. Ability to implement a plan in conditions of ambiguity and uncertainty;
4. Formation of a team, motivation of participants. Choosing the right team members, motivating them to achieve business goals;
5. Making effective decisions. Ability to make correct and effective business decisions even in the absence of information;
6. Effective networking. The ability to create professional and business networks using their own capabilities to create and develop a business;
7. Ability to cooperate. Ability to be a strong team player, work in a team, put business goals ahead of personal goals;
8. Operations management. Ability to successfully manage daily business operations;
9. Finance and financial management. Successful management of all financial aspects of the business;
10. Sale. Ability to create an effective sales system that includes purchasing, warehousing and customer service. Ability to attract customers and establish long-term relationships with them;
11. Choosing the optimal structure. Ability to work in a structured business environment that can adapt to rapidly changing external conditions and uncertainty. The ability to solve new problems without creating new structures.

Various sources have cited many different competencies necessary to achieve high performance and success in entrepreneurship.

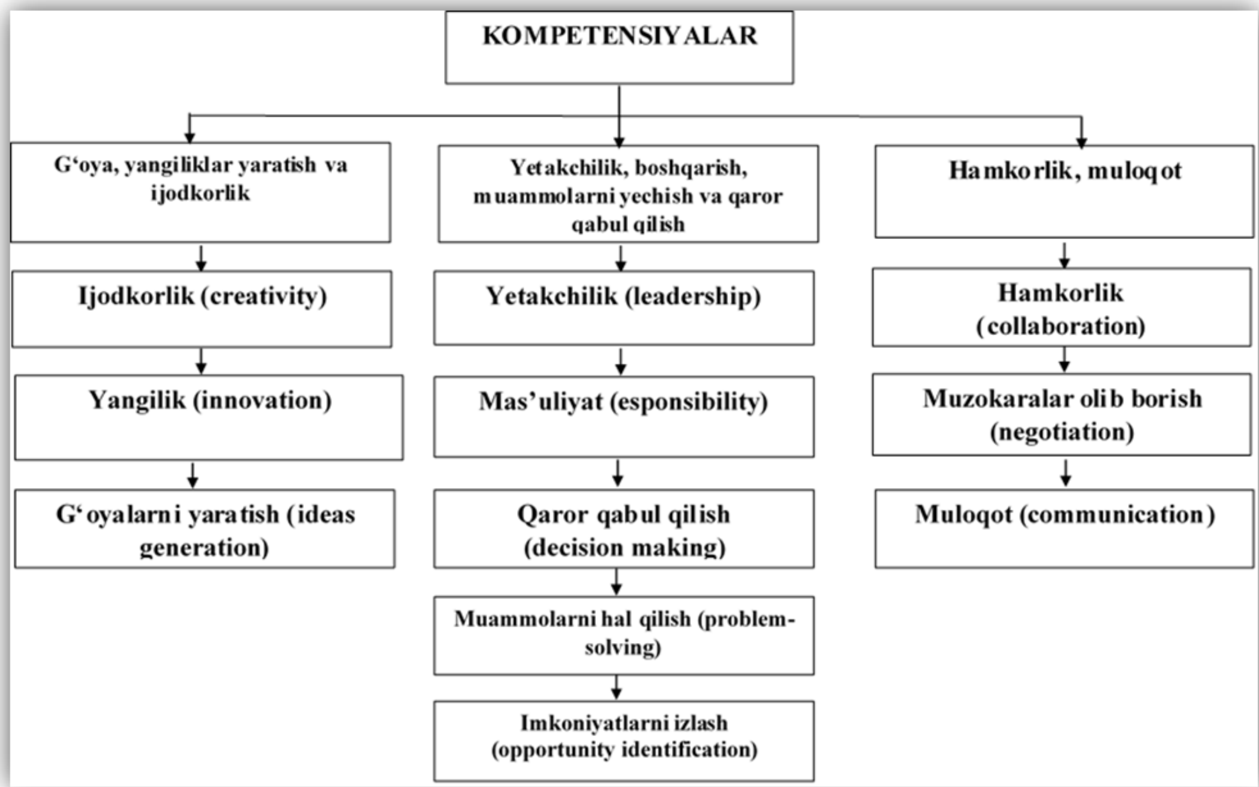
Undoubtedly, it is not possible and not necessary to form or develop all of the above-mentioned entrepreneurial competencies in students during the four-year education period in engineering higher education institutions. In fact, in any person, some competencies can be formed in the family, in pre-school education, in general secondary schools and in other (friends, workplace and community) environments. Only in a higher education institution will it be necessary to develop certain types of "hard skills" and "soft skills" competencies necessary for market relations.

The competences required for business activity presented in business publications can be summarized in terms of activity and meaning and divided into three groups (Fig. 1):

I. Idea, innovation and creativity;

II. Leadership, management, problem solving and decision making;

III. Cooperation, communication.



Summary

The majority of engineering graduates want to engage in entrepreneurial activities in their field of specialization. But they do not have enough knowledge and skills on how to start a business. Therefore, it is necessary to develop "soft skills" in addition to "hard skills" in students.

The following recommendations can be made for the development of soft and hard skills in engineering students of higher educational institutions:

1. Giving startup "elements" as assignments (tasks) of laboratory, practical training;
2. To reflect "elements" of start-up projects and business plans in course work and course project assignments;
3. It is aimed to formalize start-up projects and business plans in the graduation qualifications of selected talented students with the level of entrepreneurial competence formation of 50-60%, as well as defense of graduation qualifications with the participation of well-known business representatives or at the invitation of experts of the Incubation Center;
4. Conducting practical training for a certain period of time in the facilities of business structures (companies), firms and advanced business entities in order to form and collect information on course work, course projects and assignments of graduation qualification work.

Acknowledgment

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